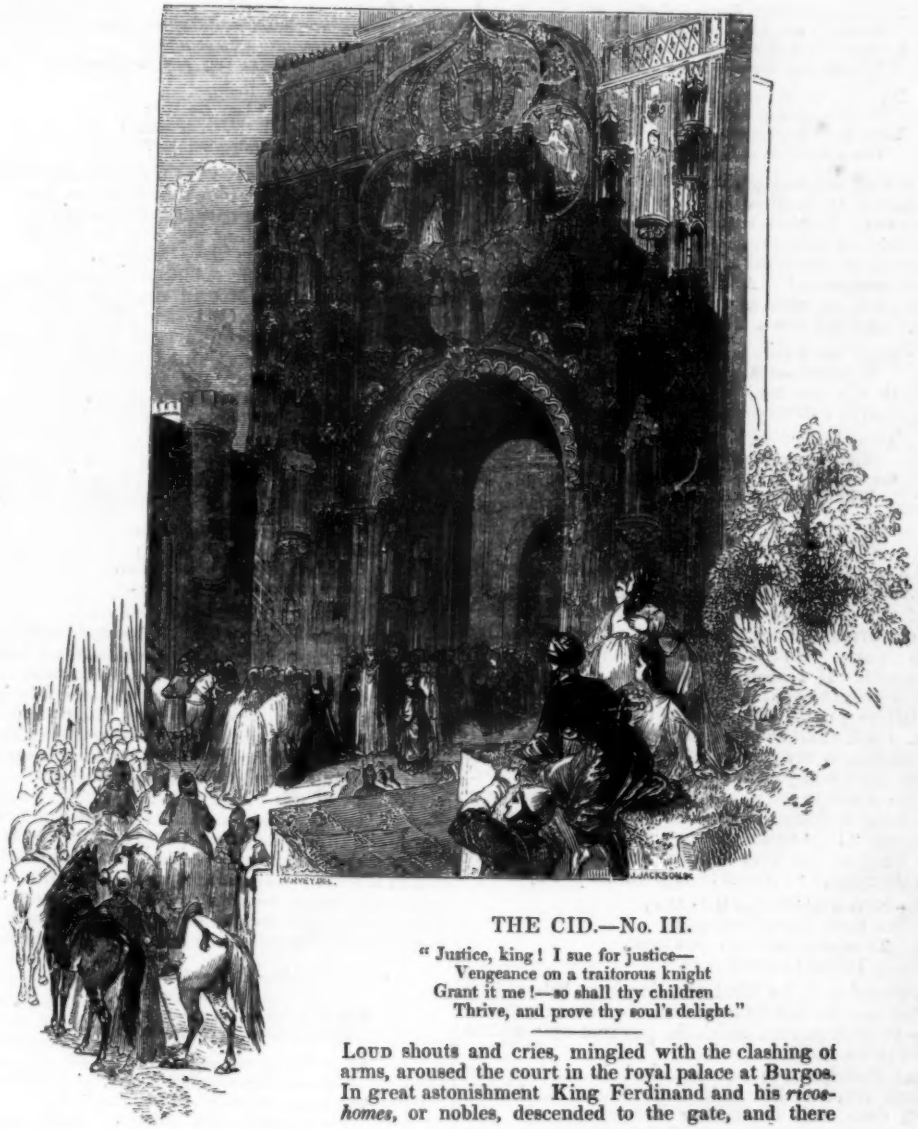

## THE CID.—No. III.

" Justice, king! I sue for justice—
Vengeance on a traitorous knight
Grant it me!—so shall thy children
Thrive, and prove thy soul's delight."

Loud shouts and cries, mingled with the clashing of arms, aroused the court in the royal palace at Burgos. In great astonishment King Ferdinand and his *ricos-homes*, or nobles, descended to the gate, and there found Ximena Gomez, daughter of the Count Lozano, attended by a numerous train. She was clad in robes of black; a gauze veil of the same hue covered her head; her hair hung in long and dishevelled tresses over her fair neck, and tears were streaming from her eyes. She fell on her knees at the king's feet, crying for justice against him who had slain her father:

" Justice, king! I sue for justice—
Vengeance on a traitorous knight.
Grant it me!—so shall thy children
Thrive, and prove thy soul's delight.

Like to God himself are monarchs
Set to govern on this earth,
All the vile and base to punish,
And to guerdon virtuous worth.'

But the king who doth not justice
Ne'er the sceptre more should sway—
Ne'er should nobles pay him homage—
Vassals ne'er his hests obey:

Never should he mount a charger—
Never more should gird the sword—
Never with his queen hold converse—
Never sit at royal board."

Her eye then fell on Rodrigo, who stood among the attendant nobles:

" Thou hast slain the best and bravest
That e'er set a lance in rest,
Of our holy faith the bulwark—
Terror of each Paynim breast.

Traitorous murderer, slay me also!
Though a woman, slaughter me!
Spare not—I'm Ximena Gomez,
Thine eternal enemy!

Here's my throat—smite, I beseech thee!
Smite, and fatal be thy blow!
Death is all I ask, thou caitiff,—
Grant this boon unto thy foe."

Not a word did Rodrigo reply, but seizing the bridle of his steed, he vaulted into the saddle, and rode slowly away. Ximena turned to the crowd of nobles, and seeing that none prepared to follow him and take up her cause, she cried aloud, "Vengeance, sirs! I pray ye, vengeance!" A second time did the damsel disturb the king, when at a banquet, with her cries for justice. She had now a fresh complaint:

"Every day at early morning,
To despite me more, I wist,
He who slew my sire doth ride by,
With a falcon on his fist.

'At my tender doves he flies it;
Many of them hath it slain.
See! their blood hath dyed my garments
With full many a crimson stain.

List!—The king who doth not justice,
He deserveth not to reign;" &c.

and she rebuked the king in the same strain as on the occasion of her former complaint. Fernando, partaking of the superstition of the age, did not relish her implied curses, and began to ponder on the course he had to pursue. "God in Heaven help me and lend me his counsel! If I imprison the youth, or put him to death, my Cortes will revolt, for the love they bear him; if I fail to punish him, God will call my soul to account. I will at all events send a letter forthwith, and summon him to my presence."

This letter was put into the hands of Diego Lainez. Rodrigo asked to see it, but the old man, suspecting some sinister design against his boy, refused to show it, saying, "It is nothing, save a summons for thee to go to Burgos; but tarry thou here, my son, and I will go in thy stead." "Never!" replied the youth,—

"Ne'er would God or Holy Mary
Suffer me this thing to do.
To what place soe'er thou goest,
Thither I before thee go."

How tender is the filial affection here betrayed by the Cid, and yet is it by no means inconsistent with the fierce burst of passion which the paternal squeeze had before called forth.

That Rodrigo was not punished is evident, for Ximena repeated her visit to the king a third and a fourth time, still demanding vengeance. On this latter occasion she was attended by thirty squires of noble blood, arrayed in long robes of black which swept the ground behind them. The king was sitting on his high-backed chair listening to the complaints of his subjects, and dispensing justice, rewarding the good and punishing the bad, for "thus are vassals made good and faithful." The mace-bearers being commanded to quit the royal presence, Ximena fell on her knees and renewed her complaint:

"King! six moons have past away
Since my sire was reft of life,
By a youth whom thou dost cherish
For such deeds of murderous strife.

Four times have I cried thee justice—
Four times have I sued in vain;
Promises I get in plenty—
Justice none can I obtain."

The king thus comforts her:

"Say no more, oh, noble damsel!
Thy complaints would soften down
Bosoms were they hard as iron,—
Melt them were they cold as stone.

If I cherish Don Rodrigo,
For thy weal I keep the boy;
Soon, I trow, will this same gallant
Turn thy mourning into joy."

Fernando probably saw, what the damsel herself did not understand, that Rodrigo's hawking at her doves in his daily rides by her dwelling, was but a rough mode of courtship, intimating that he himself was flying at higher game in their mistress.

The second feat of arms achieved by our young hero was his conquest of five Moorish chiefs, or kings, as the romances term them, who had made a foray into the territory of Castile. They had ravaged the land nearly to the gates of Burgos, the capital, everywhere unresisted; had taken many captives and a vast booty, and were returning in triumph, when Rodrigo, then but a beardless youth, who had not seen twenty summers, mounted his steed Babieca, gathered a host of armed men, fell suddenly upon the Moors as they were crossing the mountains of Oca, routed them with great slaughter, and captured the five kings, with all their slaves and booty.

"Rodrigo Diaz, great his honour;
Beardless tho' he be, and tender,
To him princes five of Moordom
Fealty and tribute render."

The spoil he divided among his followers, but reserved the kings for his own share, and carried them home to his castle of Bivar, to present them as proofs of his prowess to his mother. With his characteristic generosity, which was conspicuous even at this early age, he then set them at liberty, on their agreeing to pay him tribute; and they departed to their respective lands, extolling his valour and magnanimity.

The fame of this exploit soon spread far and wide through the land, and, as martial valour was in those chivalrous times the surest passport to ladies' favour, it must have had its due effect on Ximena's mind, and will in a great measure account for the entire change in her sentiments towards the youth which she manifested on her fifth visit to the palace at Burgos. Falling on her knees before the king, she spoke thus:—

"I am daughter of Don Gomez,
Count of Gormaz was he hight,
Him Rodrigo by his valour
Did o'erthrow in mortal fight.

King! I come to crave a favour—
This the boon for which I pray,
That thou give me this Rodrigo
For my wedded lord this day.

Happy shall I deem my wedding,
Yea, mine honour will be great,
For right sure am I his fortune
Will advance him in the state.

Grant this precious boon, I pray thee!
'Tis a duty thou dost owe;
For the great God hath commanded
That we should forgive a foe.

Freely will I grant him pardon
That he slew my much-loved sire,
If with gracious ear he hearken
To my bosom's fond desire."

"Now I see," said the king, "how true it is what I have often heard, that the will of woman is wild and strange. Hitherto this damsel hath sought deadly vengeance on the youth, and now she would have him to husband. Howbeit, with right good-will, I will grant

what she desireth." He sent at once for Rodrigo, who, with a train of three hundred young nobles, his friends and kinsmen, all arrayed in new armour and robes of a similar colour, obeyed with all speed the royal summons. The king rode forth to meet him, "for right well did he love Rodrigo," and opened the matter to him, promising him great honours and much land if he would make Ximena his bride. Rodrigo, who desired nothing better, at once acquiesced:

"King and lord! right well it pleaseth
Me thy wishes to fulfil;
In this thing, as in all others,
I obey thy sovereign will."

The young pair then plighted their troth in presence of the king, and in pledge thereof gave him their hands. He kept his promise, and gave Rodrigo Valduerna, Saldaña, Belforado, and San Pedro de Cardeña, for a marriage portion.

On the day appointed, Rodrigo was arrayed by his brothers for the wedding. Having doffed his well-burnished and graven armour, he put on first a pair of galligaskins, or long loose drawers, with fringes of purple, then his hose, and over both a wide pair of Walloon breeches, "such as were worn in that golden age," saith the romance. His shoes were of cow's leather and scarlet cloth, fastened over the instep with buckles. His shirt was even-edged, without fringe, embroidery, or stiffening, "for starch was then food for children;" his doublet or waistcoat was of black satin, with loose sleeves, and quilted throughout, the which doublet "his father had sweated in three or four battles;" over this he wore a slashed leathern jerkin or jacket, "in memory of the many slashes he had given in the field,* a German cloak lined with plush, and a cap of fine Flemish cloth with a single cock's feather, completed his costume. But we must not forget his sword Tizona, "the terror of the world,"† which he girt about him with a new belt, which, says the romance, "cost him four quartos," a sum that might have been considerable in those days, but is now only a fraction more than an English penny. Thus gaily attired, he descended to the court of the palace, where the king, his nobles, and the bishop who was to perform the ceremony, awaited him on foot. All then moved in procession to the church to the sound of music, Rodrigo walking in the midst.

After awhile came Ximena, with a veil over her head, and her hair dressed out in large flaps hanging down over her ears. She wore an embroidered gown of fine London cloth, and a close-fitting spencer with a flap behind. She walked on high-heeled clogs of red leather. A necklace of eight medals or plates of gold, with a small pendent image of St. Michael, which together were "worth a city," encircled her neck.

The happy pair met, seized each other's hands, and embraced. Then said Rodrigo with great emotion, as he gazed on his bride—

"I did slay thy sire, Ximena,
But, God wot, not traitorously;
'Twas in open fight I slew him:
Sorely had he wronged me.

A man I slew—a man I give thee—
Here I stand thy will to bide!
Thou, in place of a dead father,
Hast a husband at thy side.

All approved well his prudence
And extolled him with zeal:
Thus they celebrate the nuptials
Of Rodrigo of Castile."

Another romance, apparently of more modern date, describes the wedding costume of the Cid with equal minuteness, but very differently, dressing him in a doublet of dove-coloured satin, light scarlet hose, and slashed shoes of yellow silk, a short jacket with sleeves closely plaited beneath the shoulder, a folded handkerchief hanging from his girdle, a collar of gold and precious stones about his neck, and a short black cloak with hood and sleeves over all. This costume appears to belong to a less remote age than the former; but we have no means of determining the question, as the chronicles are wholly silent on the subject.

A third romance gives an animated description of the procession from the church to the royal palace, where the wedding feast was laid out, and tells us how the streets of Burgos* were strewn with boughs of sweet cypress—how flowered cloths were hung from the windows—how the king had raised a festive arch of great elegance at the cost of thirty-four quartos—how minstrels sung their lays to the honour of the wedded pair—and how buffoons and merry-andrews danced and played their antics, one with bladders in hand, another in the disguise of a bull, and a third in the likeness of a demon, to whom the king gave sixteen maravedis, "because he scared the women well." At the head of the procession marched the bridegroom and the bishop who had performed the ceremony, with their attendants; then followed a crowd of these boisterous merry-makers; and the king, leading the fair Ximena by the hand, with the queen and many a veiled lady, brought up the rear. As they passed through the streets, wheat was showered from the windows upon the bride—a mute but emphatic expression of a desire that she might prove prolific. The seeds fell thickly on the neck and into the bosom of the blushing Ximena, and the king officiously plucked them forth with his own hand; whereat exclaimed the wag Suero—

'"'Tis a fine thing to be a king, but Heaven make me a hand!'
The king was very merry when he was told of this,
And swore the bride, ere eventide, should give the boy a kiss.

The king went always talking, but she held down her head,
And seldom gave an answer to anything he said:
It was better to be silent, among such a crowd of folk,
Than utter words so meaningless as she did when she spoke.'

We quote from Lockhart, who has rendered with great spirit several of the romances of the Cid into English ballad metre.

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*Fall of Aerolites at Milan.*—On the 17th of July, 1840, at seven o'clock in the morning, a loud detonation was heard, resembling a peal of thunder, and near Golosecca three luminous projectiles were observed proceeding towards Somma, from east to west. The sound of the explosion extended for twenty or thirty miles round Milan. The largest aërolite was found near Ceresato, a village in the neighbourhood, having penetrated twenty inches into the earth. It weighed 10 lbs. 2 oz. The others were of smaller size, and fell near the larger one; but they have not been found.

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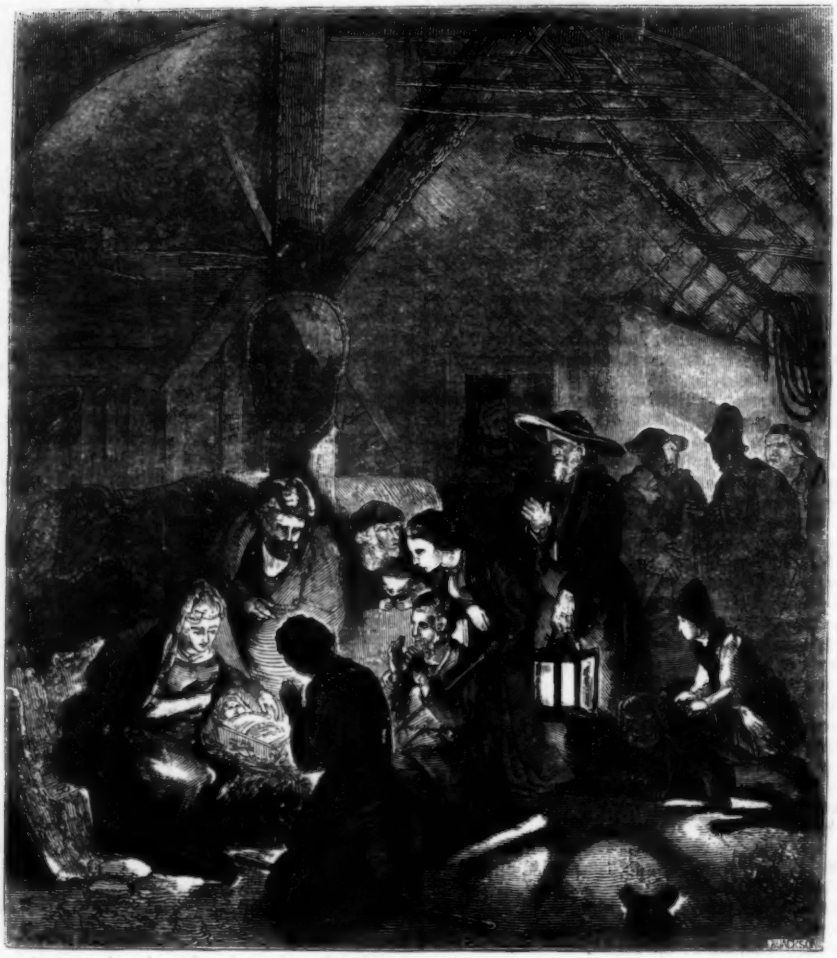
* If we may rely on the authenticity of a suit of armour shown in the Royal Armoury at Madrid as that of the Cid, these slashes must have been fashionable in Spain at a very early age, for on the cuirass of that suit are engraved rude figures of men with short slashed breeches.

† Here the romance is guilty of an anachronism; for, according to the chronicle, the poem, and other romances, Tizona did not become the property of the Cid till many years after, when he won it from the Moorish king Bucar beneath the walls of Valencia.

* The romances are not agreed as to whether the wedding was celebrated at Burgos or Palencia, but the chronicles determine it to have been at the latter city.



[The Nativity.—Rembrandt.

## GRATUITOUS EXHIBITION OF PICTURES.

### THE NATIONAL GALLERY.

THERE is no painter who has attained to a high reputation whose works are so likely, with the uninstructed in art, to mislead, both by their merits and defects, as the illustrious artist whose name stands at the head of this article. The Nativity, which is represented above, was formerly in the collection of the late Mr. Angerstein, and now, together with the other valuable pictures of that gentleman, forms a portion of the National Gallery. Of its merits as a work of art, which, in the opinion as well of critics as of practitioners of painting, are held to be of the highest order of excellence, we shall presently proceed to speak, and endeavour to point out the grounds of the admiration in which it is held, and then offer some remarks upon the principles which have guided Rembrandt in the management of his works.

As, however, this is the first time we have had occasion to criticise the productions of this painter, we will give a very short account of the leading events of his life. He was born on the 15th of June, 1606, and was the son of a miller, named Gerretz, who lived near Leyden, on the banks of the Rhine, whence, when the painter attained to reputation, he was distinguished by the title of Rembrandt van Ryn. He studied successively under Jacob van Swannenberg, Peter Lastman, and Jacob Pinas, in all not more than fifteen months. From these preceptors he learned manual dexterity, but the peculiar effects of his works, the prevalence of dark in his pictures, was the result of his own observation in his father's mill, where he had opportunities of seeing the strongest contrasts of light and shade. He worked for some time at his native place, but, having gone to the Hague, at the advice of a fellow-student, he there sold a picture for a hundred florins, and, soon after, obtained numerous commissions for landscapes and portraits, which he executed at home. In 1630 he settled in Amsterdam, and at the same time married, and undertook the tuition of many pupils, who paid one hundred florins a year each. One of his earliest and steadiest patrons was the burgomaster Six, for whom he painted the Woman taken in Adultery, which now forms another of the most splendid ornaments of the National Gallery. Rembrandt was scarcely less eminent as an engraver than as a painter, but we have no occasion here to speak upon that sub-

ject. He died at Amsterdam, having accumulated considerable wealth, in 1674. A tale has been told of him which has been related of other artists, and is, perhaps, about as true of him as of any other. It is, that finding, during his earlier career, his pictures were not purchased so promptly as he wished, he caused it to be given out that he was dead, ordered a sale of his paintings and engravings, and so enhanced their value.

The subject of the Nativity is one which has been frequently handled by Rembrandt, and by other painters of the same school; by them, perhaps, on account of its presenting an opportunity, from the homeliness of its locality, of indulging in their favourite representations of familiar life; by Rembrandt, without doubt, from its affording a noble field for the display of his peculiar power. In observing the work now before him, it will not fail to strike the intelligent spectator that the composition is lighted from two distinct sources; the chief splendour is derived from the glory emanating from the divine Infant, whilst the right-hand portion is illuminated by the lantern in the hand of the standing figure, and the background is further lighted by some means not comprised within the limits of the picture. This has enabled the painter to distinguish between the supernatural and the natural lights, and the various gradations of both, and the effect produced must be at once admitted to be masterly in the extreme. The first presents a greater purity of tint, and the latter a glowing richness, which, whilst it contrasts forcibly with the surrounding shadows, adds, by its increased yellowness, brilliancy even to the emanation proceeding from the cradled Redeemer. The background represents the interior of a stable, and the cattle give identity to the scene.

Rembrandt is said not only to have repudiated the beauties of Grecian and Italian art, but also to have ridiculed them; but whether so or not, certain it is he never, in his own practice, evinces purity of form, and very rarely justness of proportion. Indeed his figures are remarkable for their uncouthness, and sometimes deformity, rather than for their beauty, and he would almost appear to have preferred vulgarity to grace. He seems to have generally had defective models to work from, and to have scrupulously followed what he saw.

Thus disclosing the prevailing fault of the painter brings us to the point where we may describe what are his excellences above all others, and what is the principle upon which he constructed his works.

The great merit, then, of Rembrandt consists in his profound knowledge of harmony in colouring, and of his management of the lights and darks, technically called chiaro-'scuro. In the former, his pictures evidence his skill by the fact that the moment they meet the eye they produce a pleasing sensation. The untutored spectator is first struck by the glowing richness of the performance, before he proceeds to consider the deformity of the figures, and voluntarily admits that he is gratified without knowing wherefore he is pleased. In compositions such as that now under notice, namely, interiors lighted only in a small proportionate degree, this is more frequently the case than in other works of this master. A larger space, only partially illuminated, must naturally present powerful contrasts, and such as the most uncultivated eye must at once understand; but in exterior views, where there is a much larger proportion of light, and in which, notwithstanding, strong oppositions of dark are to be found, it requires much greater knowledge of the principles of art to form a just estimate of their correctness. We have, however, now to speak only of the class of which the cut above is a brilliant example. In observing a picture of this class, the spectator, after the first sensation of visual pleasure has subsided, should consider whether the effect depicted is accounted for by the subject itself, that is, whether, for the shadows he sees before him, there is a light placed in such a position in the picture, or indicated as being beyond its limits, as must necessarily produce such a shade; if he find that to be the case, he may be sure that the painter has achieved his end, he has gratified the eye and has satisfied the understanding. If, upon further inspection, he finds that the painter has so arranged his colours that the most brilliant and the lightest shall form a portion of that part of the picture from which or by which it is illuminated, and shall find the dark draperies and other objects so introduced as to combine with the shadows to form a contrast, he will, in some degree, perceive and understand what is meant by the term chiaro-'scuro. In a word, then, a person in viewing the works of Rembrandt must look for fidelity of effect, and not for correctness of drawing.

If we regret the absence of that dignity of form with which Raffaelle invests his Scripture characters, we must not pass over without notice the fact that as the great events of the life of the Saviour, from his birth in a stable to his death by the most shameful punishment of the cross, were characterised by lowliness, and as most of the important agents in the progress of Christianity itself were of humble station, as in the instances of Peter and Andrew and James and John, there is perhaps less blame attachable to Rembrandt for the familiarity of his figures in such subjects than would at first sight appear. He knew that the instruments of the divine revelation were of lowly birth and of mean occupation, and he therefore represented in his pictures such forms as his models presented undignified by any adventitious aid from his pencil. He painted for brilliancy of effect and splendour of colouring, and not for beauty of form or majesty of expression. It is, therefore, for the former qualities that he is to be prized.

The works of Rembrandt are open to observation for his neglect of the propriety of costume, but we must not on that account the less value the truth of what he does represent. It is unquestionably better that the verity of history should be preserved in all works of art, but all parts of a picture should represent a consistency of date; yet, because historic truth is violated, we must not be led into an opposite extreme, and refuse our approbation to the fidelity of the imitation which is before us. If this painter, like other artists of his own school, and eminent ones of the Venetian and Flemish schools, has violated history, still he has not violated painting in its rules, so long as the things he has represented are, in themselves, true to nature.

It is sometimes objected that no effect is to be observed exactly similar to that given by Rembrandt; that in no instance can we see such depth of shadow where there is positive light. To a certain extent this is true, and the reason is manifest, for no painting can exactly imitate positive light, though it may give the effect of it by the minute exactness with which the gradations from light to dark are depicted. If, by so much as the brightest part of a picture necessarily falls short of positive light, in the same degree the other parts of it are made so much darker than reality, the scale of proportion is preserved, and the work is therefore consistent in itself, and true as an imitation of nature. If this be borne in mind in watching the productions of Rembrandt, it will greatly tend to familiarise the untutored in art to the superb contrasts he displays.

Of the principle by which this great genius was guided, it will be necessary only to say that he con-

sidered the power of his picture was to be gained by an infinitely greater proportion of dark than light, a principle diametrically opposed to that by which Rubens was guided in his practice.

We avoid, as much as possible, technical phraseology, but there is one point of a practical nature to which the attention of a visitor to this picture may be drawn. It is the mode in which the artist worked. The glowing effect caused by the lights in his pictures is produced by the masterly use of what artists call glasing, that is, painting over opaque colour with rich transparent tints, a practice which originated with the Venetian school, and was adopted by those of Holland and Flanders. It is acknowledged that no other mode of operation will give equal brilliancy, and it cannot be denied that by no hand has it been more skillfully applied than that of the illustrious Rembrandt.

## HOW IS A RAILWAY TRAIN PROPELLED?

[Continued from page 29.]

IN our previous article we trust we have enabled the reader to comprehend "what constitutes a steam-engine." It is not the application of steam-power to any particular purpose, but it is the production of a reciprocating motion. A portion of water in a boiler is exposed to the action of fire; steam is formed; this steam is admitted into a cylinder, through which a piston works; the steam drives up the piston, and is then converted into water by being put in communication with a cold vessel; a vacuum is thus formed below the piston, and this, and steam admitted above it, press down the piston; this second amount of steam is condensed; and a new series of similar movements occur. The piston thus being set in motion, a connecting rod communicates this motion to machinery, by which the motion is converted into some definite kind by cranks or other means. This is the great principle of the process; and by far the larger part of the beautiful but complicated mechanism seen in a steam-engine consists of matters of detail not involving the principle on which the engine acts, but tending to bring that principle to better account. Such an engine is a *condensing* engine. The application of steam-power to locomotion and to shipping frequently requires a modification of the arrangement, constituting a *high-pressure* engine, the nature of which will be seen hereafter.

How many a railroad traveller has marvelled at the hidden power which propels him and his companions at so rapid a rate! He books his place, pays his fare, enters one of a long string of vehicles, and presently feels himself to be in motion. Before and after him may be human beings, cattle, horses, private carriages, merchandise; yet all are driven on by the same impulse, and with a rapidity which, twelve years ago, we would have deemed almost chimerical. The traveller finds the train headed by an engine which appears to afford the moving power,—by a mechanical horse, in fact, which requires no other provender than coke and water; and he may naturally wish to gather a brief outline of the mode in which this most valuable species of horse performs its work. This outline we will endeavour to give.

In pages 28 and 29 of the present volume we explained the main points which constitute a steam-engine, as well as the mode in which the power there gained is made available for the production of circular motion. For a locomotive carriage another form of engine is necessary, principally on account of the inconveniently large space which a *condensing* apparatus would occupy. It will be remembered, that the steam which moves the piston in a common steam-engine is afterwards conveyed to a vessel surrounded by cold water, the chilling effect of which re-converts the steam into water, and thereby produces a vacuum beneath the piston. But in an engine destined for motion, both size and weight become matters of importance; and if the condensing apparatus can be dispensed with altogether, the engine will obviously be rendered smaller and lighter.

The only mode of getting rid entirely of the principle of condensation in the steam-engine is to employ steam of such a power as greatly exceeds the pressure of the atmosphere. All the beams, rods, &c. of a steam-engine are subject to atmospheric pressure; and in Newcomen's engine it was this pressure, acting on one side of a piston while the other side was in *vacuo*, which caused the descent of the piston. In Watt's engines the atmosphere is excluded, but still the force of the steam does not greatly exceed that of the atmosphere. In the locomotive-engine, however, the condensing apparatus being absent, it is found that powerfully heated steam is required, which steam having a great pressure, such engines are termed *high-pressure*, in contradistinction to condensing or *low-pressure* engines. These terms are generally but not universally correct, for the principle of high-pressure is sometimes combined with that of condensation.

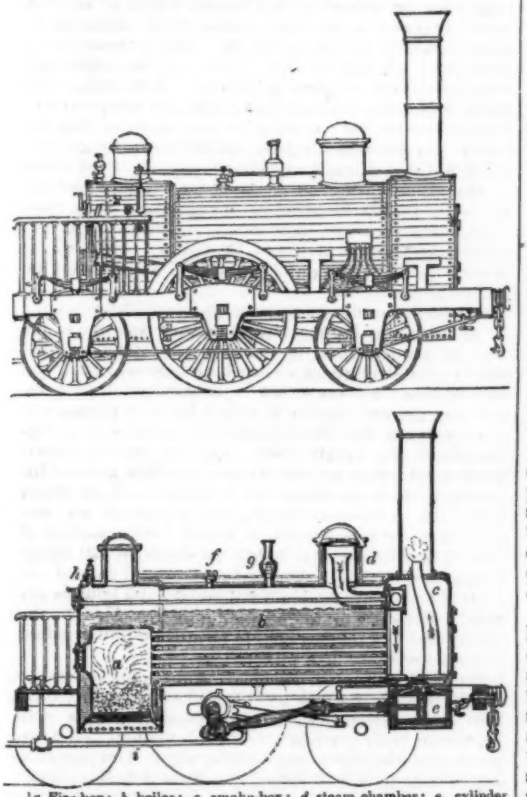
When water boils freely in an open vessel, the steam rising from it has a pressure or elasticity equal to that of the atmosphere. Under ordinary circumstances, when the barometer indicates about 30 inches pressure, this occurs at the temperature of 212°. Under no circumstances can boiling water, in an open vessel exposed to the free action of the atmosphere, greatly exceed this temperature. But a closed vessel produces a change of effect; for if it be sufficiently strong to resist a bursting pressure from within, the water is capable of attaining a far higher temperature; indeed we know of no limit to this increase but the inability of the vessel to bear the pressure. In general the steam of boiling water exerts a pressure of about 15 pounds on every square inch of surface exposed to it; but with an increase of temperature in a close vessel, this pressure increases very rapidly; for instance, at 226° it is about 20 pounds; at 238°, 25 pounds; at 257°, 35 pounds; at 300°, 70 pounds on the square inch.

Now this rapidly increasing pressure is the source of power in the high-pressure engine; and one of the chief problems which the maker has to solve is, what must be the strength of a close boiler, to bear such and such a pressure from within? In practice, high-pressure engines are employed with a force or pressure of steam varying from twenty to one hundred and twenty pounds on the square inch. Let the reader clearly understand this point, and he will see how great is the pressure which the boiler has to sustain. If the boiler were of a cylindrical shape, and measured six feet long by three in diameter, it would have a surface of more than 9000 square inches: if steam of 120 inches pressure were within the boiler, it would exceed the atmospheric pressure from without by 105 pounds per inch; which would give ($105 \times 9000 = 945{,}000$) the enormous force of nearly one million pounds tending to burst the boiler from within.

A power, similar to this in its origin, but of less intensity, is that to which locomotive-engines owe their value. A piston-rod is connected by a crank with the wheels of the carriage, in such a manner that when one moves the other must move also. The object is therefore to give a reciprocating motion to the piston; and this is effected by admitting high-pressure steam into the cylinder wherein the piston works, so that a portion of steam, after moving the piston, may escape into the open air, and leave room for the piston to return by the force of a new supply of steam admitted on the other side of it.

Although James Watt conceived the idea of such an

employment of high-pressure steam, yet Messrs. Trevithick and Vivian appear to have been the first to put it in action, about forty years ago. They constructed a steam-carriage, which proved a precursor to some others used on the tramways in the north of England and in Wales; but the subject was not fairly tested until the railway system developed its wonderful power. While the projectors of the Liverpool and Manchester Railway were engaged in that important undertaking, they were in doubt as to what moving power might best be applied to the carriages, whether horse-power, stationary engines with traction ropes, or locomotive engines. The first two were successively abandoned, and the last resolved on; but in order to obtain the utmost amount of power with the least expenditure of fuel, a premium was offered to the owner of any locomotive-engine which should, on a certain trial-day, produce the most favourable results. The trial took place in October, 1829, and the premium was awarded to Messrs. Stephenson and Booth, for the performance of the 'Rocket' engine. Since that time, numerous lines of railway have been opened; and such gradual changes and improvements have been made in the locomotive-engines, as to bring them to the form represented in the annexed cut. The upper figure shows the external appearance, familiar to all railroad travellers; the lower figure is a longitudinal section, through the middle of the engine.




[*a*, Fire-box; *b*, boiler; *c*, smoke-box; *d*, steam chamber; *e*, cylinder and piston; *f* and *g*, safety valves; *h*, steam-whistle; *i*, feed-pipe.]

The larger part of the engine is occupied by the boiler, made generally of iron, but sometimes of copper. At the hinder end of the boiler is a fire-box, so arranged as to be surrounded by water at every part except a door at which the fuel is introduced, and an open grating at bottom, the object of this water envelope being to prevent as much as possible the radiation and loss of heat. A man stands on the little stage or gallery at the back of the engine; and a carriage called a *tender*, containing coke and water, comes next after the engine, between it and the passenger carriages. The operations may be conceived to go on in the following manner.

The feed-pipe conveys water from the tender into the boiler by the action of a small forcing-pump placed beneath the latter, and worked by the piston-rod. Supposing then the boiler to have its proper quantity of water, the fire-box to have been supplied with coke, and a fire lighted, the smoke and heated air soon fill the fire-box, and then traverse a number of brass tubes which pass from end to end of the boiler, that is, from the fire-box to the smoke-box. These tubes are sometimes as many as a hundred and twenty in number, and about an inch and a half in diameter; and their object is to present as much heated surface as possible to the water in the boiler. The smoke and air, after losing a great portion of their heat, pass into the smoke-box, from thence upwards into the chimney, and thence into the open air. This mode of tubing the boiler is one of the greatest improvements which have been introduced in locomotive engines, since the extent of heated surface causes the water to boil in a surprisingly short time.

So much for the fire and its appendages: now for the steam. As the inside of the boiler is wholly shielded from the atmosphere, the water may be made to attain as high a temperature as the strength of the boiler will admit; and the space between the water and the roof of the boiler becomes filled with steam of very high pressure. This steam is mixed with a good deal of spray from the water, and in order to effect a separation, the steam is made to ascend into a steam-chamber before it descends to the cylinder. After the separation from the spray, the steam descends the steam-pipe in the direction of the arrows, and then enters a little chamber, where, by the action of an ingenious sliding valve, it passes alternately before and behind the piston into the cylinder. The piston is thus driven alternately backwards and forwards; and at each motion the steam, after having performed its office, passes into a waste pipe, and goes upwards in the direction of the arrow into the chimney, the latter thus serving to carry off both steam and smoke.

The piston being set in motion backwards and forwards, the rod to which it is connected acts, by the intervention of a crank, on the large central driving-wheels, which are thus made to revolve, and consequently the whole machine to be set in motion. The puffs or 'pantings' which we hear several times in a second, are occasioned by the escape of the steam from the cylinder, after it has performed its work, into the chimney. There are two cylinders and two cranks on opposite sides of the machine; but the description of one set will avail for the other also.

The engine-man, on the little stage behind the boiler, has several pieces of mechanism under his immediate control. By means of the steam-whistle (*h*) he can admit steam into a small receptacle, where, passing through a minute aperture, and striking against a sharp edge, it produces a piercing noise, which acts as a warning signal. Near this whistle is a handle which, by means of a rod, opens or shuts a valve in the steam-pipe, and thereby regulates the admission of steam to the cylinder. Gauge-cocks are placed at the back of the boiler, by which the engineer knows how much water is in the boiler; and if the quantity be deficient, another handle, near his foot, enables him to open a communication between the water-tank in the tender and the feed-pipe by which the supply is renewed. At the upper part of the boiler are two valves,

so regulated that when the steam exceeds a certain pressure, these valves are opened, and the steam escapes: one valve is under the control of the engine-man, but the other (*g*) is locked up, thus acting as a check against the engine-man, should he desire to increase the rapidity of the engine (and therefore the pressure of the steam) beyond proper limits. There is reason to believe that in some cases this valve likewise is, very improperly, placed at the discretion of the engine-man.

A provision for opening and shutting the valves in the cylinder several times in a second, another piece of mechanism for reversing the motion of the vehicle, a brake for retarding the revolution of the wheels, &c., are also portions of this beautiful engine; but what we have briefly described constitute the essentials, by which the general principle of action is regulated. The motion of the locomotive engine being once produced, the manner in which the tender and the long train of carriages are set in motion, by being linked to it and to each other, need hardly be told. With regard to the high velocity attained, we must refer it to three conjoined causes, viz. the powerful action of steam as a prime mover, the near approach to a level on which the carriages move, and the smoothness of an iron rail-track, compared with a gravel road.

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Children should be inured as early as possible to acts of charity and mercy. Constantine, as soon as his son could write, employed *his* hand in signing pardons, and delighted in conveying, through *his* mouth, all the favours he granted. A noble introduction to sovereignty, which is instituted for the happiness of mankind.—*Jortin.*

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## DOGS, FOREIGN AND DOMESTIC.

[Continued from p. 11.]

If the long-muzzled breeds of our dogs be deemed the nearest to the primitive wild stock, whatever that may have been, it will follow that, in proportion as the domestic varieties lose this characteristic elongation of the head, and have the muzzle abbreviated, and the forehead and volume of the skull itself enlarged, they recede from their original type, and may be presumed to have been more influenced by the many causes which are involved in domestication. They are, in fact, more completely domesticated, and, if the term be allowed, civilized. Such are the dogs comprising the section of which the engraving gives characteristic examples. In our former paper we alluded to the shepherd's dog, which Buffon regards as nearest to the primitive stock, but which is more remote, if our ideas be correct, than he supposes. This valuable and intelligent dog is placed by F. Cuvier in the second section, distinguished by the head being very moderately elongated, the forehead being elevated, and the cerebral cavity comparatively voluminous. In referring the shepherd's dog to this section, we consider F. Cuvier to be right, but at the same time we think that it is to be regarded as a link between this and the previous group. Its muzzle is more elongated and sharper than in the spaniel; its ears are short and erect, or semi-erect, and its general contour is light, strength and activity being combined. Still its skull is developed, and its intelligence is extraordinary. Of the discrimination, sagacity, and faithfulness of these dogs, many authenticated accounts are current. The shepherd's dog knows its master's flocks, probably by the mark impressed upon the wool; it will single out a sheep, under the direction of its master, from the rest, keep it separate, or disengage it again from the flock, should it regain and mingle with them; it will keep two flocks apart; and, should they coalesce, re-divide them. It will watch and defend them from strange dogs or foxes, and it will drive them to any place required.

We knew, some years since, a dog of the shepherd's breed, which belonged to a man who had a large herd of cows under his charge. During the summer they were depastured on very extensive fields (in Cheshire) communicating with each other, and morning and evening this dog, at the bidding of his master, would collect them all together and gently drive them to the accustomed milking-place. If, when he had driven them for some distance, he discovered that one was missing, he would run back and traverse the fields till he met with the object of his search, which he would conduct to the herd, and then pursue his ordinary duty.

Closely allied to the shepherd's dog is the cur, or drover's dog. This useful animal is larger than the shepherd's dog; the hair is generally shorter, and the tail, even when not cut purposely, often appears as if it had been so. Bewick, who was well acquainted both with the drover's and the shepherd's dog, speaking of the former, says, "many are whelped with short tails, which seem as if they had been cut, and these are called in the north self-tailed dogs." The same writer is disposed to consider this breed as a true or permanent kind, and he informs us that great attention is paid to it. It seems to us, however, that the drover's dog is, in reality, a cross between the shepherd's dog and some other race, perhaps the terrier. It often partakes largely of the characters of the shepherd's dog, but is taller in the limbs. These dogs bite severely, and always attack the heels of cattle, so that a fierce bull is easily driven by them. They are singularly quick and prompt in their actions, and, as all who have watched them in the crowded noisy tumultuous assemblage of men and beasts in Smithfield must have observed, they are both courageous and intelligent. To their masters, who often ill-treat them, they are faithful and attached.

The Siberian dog, as depicted by Buffon, is closely allied to the shepherd's dog, but is larger; and, from the inclemency of its country, more densely coated with long shaggy hair, which felts like wool. A fine female dog of this breed in our possession is singularly faithful and intelligent, but very noisy, pleasure being expressed by a loud barking, continued, if the animal be not checked, during a walk of two or three miles. She is an excellent house-guard, and her bark on the approach of strangers is very different from that of pleasure. So great is her indifference to cold, that she does not hesitate to plunge into the Thames, with the thermometer far below the freezing-point, nor does she suffer the slightest inconvenience; a heap of snow or the frost-bound earth is preferred to a snug kennel as a sleeping-place. It is not without difficulty that she is restrained from chasing sheep and cattle, and will often, to our annoyance, slink off, when unperceived, and scour the fields, driving oxen or sheep before her.

Of the present section of dogs, the shepherd's dog and its allies seem to form a distinct group, in which we suspect the lurcher should be also included, though this may possibly be a mixed breed between the greyhound and rough terrier, or greyhound and shepherd's dog. Bewick figures and describes it. He says that it is less and shorter than the greyhound, with stronger limbs; its body is covered with a rough coat of hair, most commonly of a pale yellow colour; its aspect is sullen, and its habits, whence it derives its name, are dark and cunning. "As this dog possesses the advantage of a fine scent, it is often employed in killing hares and rabbits in the night-time." It steals silently and cautiously upon them while they are feeding, and then suddenly darts forward and seizes them. It is said that a well-trained dog will make terrible havoc in a preserve for hares, or in a warren